

Substitute Specification. Also enclosed is a marked up version of the substitute specification showing the changes.

IN THE CLAIMS:

- 5            On page 100 of the claims, delete "Patent Claims" and substitute --I CLAIM AS MY INVENTION--.

            Please cancel claims 1-263 without prejudice.

            Please substitute claims 264-336 as follows:

- 10           264. A laser radiation source for generating a laser beam with high power density and high energy for processing material, comprising:

            a plurality of directly modulatable, diode-pumped fiber lasers having outputs arranged in a first ordering pattern; and

- 15           an optical unit connected to the outputs of the fiber lasers wherein laser beams emerging from the outputs of the individual fiber lasers are shaped and aligned such that they impinge onto a processing surface in a second ordering pattern.

- 20           265. The laser radiation source according to claim 264 wherein the outputs of the fiber lasers are arranged in at least one of at least one track next to one another and in at least one plane above one another for forming the first ordering pattern.

- 25           266. The laser radiation source according to claim 264 wherein the outputs of the fiber lasers are arranged in a bundle for forming the first ordering pattern.

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267. The laser radiation source according to claim  
264 wherein the laser beams are combined and bundled in  
the optical unit for forming the second ordering pattern  
such that the laser beams generate processing points on  
the processing surface lying next to one another at at  
least one of in at least one track and lying above one  
another in at least one plane.

268. The Laser radiation source according to claim  
264 wherein the laser beams are combined and bundled in  
the optical unit for forming the second ordering pattern  
such that the laser beams generate a single processing  
point on the processing surface.

269. The laser radiation source according to claim  
264 wherein the laser beams generated in the fiber lasers  
are directly modulated.

270. The laser radiation source according to claim  
264 wherein at least one modulation device is provided  
in the optical unit for modulation of the laser beams.

271. The laser radiation source according to claim  
270 wherein the modulation device is designed as one of  
an electro-optical modulator and an electro-optical  
deflector.

272. The laser radiation source according to claim  
270 wherein the modulation device is designed as one of

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an acousto-optical modulator and an acousto-optical deflector.

273. The laser radiation source according to claim 270 wherein the modulation device is designed multi-channel.

274. The laser radiation source according to claim 264 wherein

the outputs of the fiber lasers are coupled to the optical unit with adjustable terminators; and

the terminators comprise lenses for shaping the laser beams.

275. The laser radiation source according to claim 274 wherein

the optical unit comprises a radiation entry and a beam exit; and

mounts are provided at the radiation entry, the terminators being adjustable in said mounts such that the laser beams at the beam exit of the optical unit are directed onto the processing surface.

276. The laser radiation source according to claim 264 wherein the output of at least one fiber laser comprises at least one passive fiber.

277. The laser radiation source according to claim 264 wherein

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the optical unit comprises a radiation entry and a radiation exit; and

the optical unit comprising an optical unit in a region between the radiation entry and the radiation exit for merging the laser beams.

278. The laser radiation source according to claim 277 wherein at least one of mirrors, lenses, wavelength-dependent elements and polarization-dependent elements are employed for merging the laser beams.

279. The laser radiation source according to claim 277 wherein the optical unit for merging the laser beams are arranged at one of in front of and behind the modulation device.

280. The laser radiation source according to claim 264 wherein the optical unit comprises a unit for reducing spacing of symmetry axes of the laser beams.

281. The laser radiation source according to claim 264 wherein the optical unit comprises an optical transmission unit for optical transmission of the laser beams onto the processing surface.

282. The laser radiation source according to claim 281 wherein the optical transmission unit contains an interchangeable objective.

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283. The laser radiation source according to claim 264 wherein the optical unit is designed such that the laser beams form beam constrictions in a region of the processing surface.

284. The laser radiation source according to claim 264 wherein the optical unit comprises an adjustable objective with long focal length with which focusing of processing points onto the processing surface is variable.

285. The laser radiation source according to claim 264 wherein the optical unit comprises an adjustable vario objective with which focusing of processing points onto the processing surface and a spacing between the processing points is variable.

286. The laser radiation source according to claim 264 wherein the laser radiation source comprises a unit with which unwanted laser beams that are not intended to produce a processing effect on the processing surface are rendered ineffective.

287. The laser radiation source according to claim 286 wherein the laser radiation source comprises an intercept arrangement with which unwanted laser beams that are not intended to produce a processing effect on the processing surface are kept away from the processing surface.

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288. The laser radiation source according to claim 287 wherein the intercept arrangement comprises a sump into which unwanted laser beams that are not intended to produce a processing effect on the processing surface are conducted.

289. The laser radiation source according to claim 288 wherein the sump comprises an absorbent material.

290. The laser radiation source according to claim 288 wherein the sump is designed as a heat exchanger.

291. The laser radiation source according to claim 287 wherein the unwanted laser beams are conducted onto the intercept arrangement with mirrors.

292. The laser radiation source according to claim 291 wherein an optical element that retains laser radiation potentially reflected or back-scattered from the intercept arrangement is inserted between the mirrors and the intercept arrangement.

293. The laser radiation source according to claim 264 wherein the laser radiation source comprises a unit for defocussing unwanted laser beams with which the unwanted laser beams that are not intended to produce any processing effect on the processing surface are defocussed such that they produce no processing effect on the processing surface.

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294. The laser radiation source according to claim 264 wherein at least one of the optical unit and parts thereof comprise a unit that prevents a contamination of the optical components.

295. The laser radiation source according to claim 294 wherein at least one the optical units and parts thereof are free of materials that give off gasses.

296. The laser radiation source according to claim 294 wherein at least one of the optical unit and parts thereof are closed gas-tight.

297. The laser radiation source according to claim 294 wherein at least one of the optical unit and parts thereof comprises optical windows for passage of the laser beams.

298. The laser radiation source according to claim 264 wherein the outputs of the fiber lasers are combined in a receptacle in the optical unit, said receptacle being designed such that the laser beams are directed onto the processing surface.

299. The laser radiation source according to claim 298 wherein the receptacle is designed multi-part.

300. The laser radiation source according to claim 299 wherein a first part of the receptacle contains the

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unit for merging the laser beams and a subsequent, second part contains a transmission unit.

301. The laser radiation source according to claim 300 wherein the first part of the receptacle is designed as a housing.

302. The laser radiation source according to claim 301 wherein the housing is evacuated.

303. The laser radiation source according to claim 301 wherein the housing is filled with a protective atmosphere.

304. The laser radiation source according to claim 264 wherein an arrangement for removal of material eroded from the processing surface is provided between the optical unit and the processing surface.

305. The laser radiation source according to claim 304 wherein

the arrangement for removal of the material eroded from the processing surface comprises a through opening with a beam entry and a beam exit for the laser beams directed onto the processing surface, whereby a processing space is formed between the beam exit and processing surface;

at least one extraction channel connected to the processing space is provided; and

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the extraction channel is in communication with a vacuum generating unit.

306. The laser radiation source according to claim 305 wherein a through opening is conically designed between beam entry and beam exit.

307. The laser radiation source according to claim 304 wherein the arrangement comprises at least one compressed air channel whose one opening is connected to the processing space and whose other opening is connected to a generating device for at least one of compressed air and gas.

308. The laser radiation source according to claim 307 wherein

the compressed air channel is designed as a nozzle bore; and

the axis of the nozzle bore is directed onto the processing spot.

309. The laser radiation source according to claim 304 wherein the arrangement comprises at least one bypass bore connected to the compressed air generating device.

310. The laser radiation source according to claim 309 wherein the bypass bore is arranged such that an air flow in the direction of the processing surface arises in a through opening.

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311. The Laser radiation source according to claim 304 wherein a filter device for picking up the material released during the processing of material is provided between the extraction channel and the vacuum generating device.

312. The laser radiation source according to claim 264 wherein a control circuit for regulating the laser radiation is provided.

313. The laser radiation source according to claim 264 wherein continuous wave lasers are provided for generating the laser beams, said continuous wave lasers being respectively capable of being modulated with a modulator arranged outside the laser resonator, with at least one of the pump energy and directly.

314. The laser radiation source according to claim 264 wherein quality-switched lasers known as Q switch lasers are provided for generating the laser beams, said quality-switched lasers being respectively capable of being modulated with at least one of a modulator arranged outside the laser resonator, with the pump energy, with the Q-switch and directly.

315. The laser radiation source according to claim 264 wherein the laser radiation source is employed in an apparatus for processing material, particularly in an apparatus for producing printing forms.

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316. An apparatus for processing material with laser radiation having high power density and high energy, comprising:

at least one laser radiation source displaceable relative to a processing surface for generating a laser beam and that comprises a number of directly modulatable, diode-pumped fiber lasers whose outputs are arranged in a first ordering pattern, comprising an optical unit connected to the outputs of the fiber lasers, and wherein the laser beams emerging from the outputs of the individual fiber lasers are shaped and directed such that they impinge a processing surface in a second ordering pattern;

a cooling system for cooling the laser radiation source;

a material carrier for the processing surface;

a drive unit for moving the material carrier with the processing surface in a principal processing direction and for relative movement of the material carrier with the processing surface relative to the laser radiation source in a secondary processing direction; and

a control unit for controlling the laser radiation source and the drive unit.

317. The apparatus for processing material according to claim 316 wherein the outputs of the fiber lasers in the laser radiation source are arranged in at least one of at least one track next to one another and

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in at least one plane above one another for forming the first ordering pattern.

318. The apparatus for processing material according to claim 316 wherein the outputs of the fiber lasers in the laser radiation source are arranged in a bundle for forming the first ordering pattern.

319. The apparatus for processing material according to claim 316 wherein the laser beams are combined and bundled in the optical unit of the laser radiation source for forming the second ordering pattern such that the laser beams generate processing points on the processing surface lying next to one another in at least one of at least one track and lying above one another in at least one plane.

320. The apparatus for processing material according to claim 316 wherein the laser beams are combined and bundled in the optical unit of the laser radiation source for forming the second ordering pattern such that the laser beams generate a single processing point on the processing surface.

321. The apparatus for processing material according to claim 316 wherein an arrangement for removal of the material eroded from the processing surface is provided.

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322. The apparatus for processing material according to claim 321 wherein the arrangement for removal of the material eroded from the processing surface is designed as one of a scraper and a brush device.

323. The apparatus for processing material according to claim 316 wherein at least some components of the apparatus are accommodated in a housing.

324. The apparatus for processing material according to claim 316 wherein

the material carrier is a drum that rotates in the principal processing direction; and

the laser radiation source is displaced axially at the drum in the secondary processing direction with a carriage.

325. The apparatus for processing material according to claim 316 wherein

the material carrier is a flat bed;

the laser radiation source comprises a light deflector that deflects the laser beams across the flat bed in the principal processing direction; and

the flat bed and at least the light deflector are displaceable relative to one another in the secondary processing direction with a linear guide.

326. The apparatus for processing material according to claim 316 wherein

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the material carrier is a hollow bed;  
the laser radiation source comprises a light  
deflector that deflects the laser beams across the hollow  
bed in the principal processing direction; and  
5 the hollow bed and at least the light deflector are  
displaceable in the secondary processing direction with  
a linear guide.

327. The apparatus for processing material  
according to claim 316 wherein the apparatus is designed  
10 for the production of printing forms and the material to  
be processed is a printing cylinder and a printing plate.

328. The apparatus for processing material  
according to claim 316 wherein the laser radiation source  
comprises at least one modulation device provided in the  
15 optical unit for modulation of the laser beams and  
wherein the modulation device is designed as one of an  
electro-optical modulator, an electro-optical deflector,  
an acousto-optical modulator, and an acousto-optical  
deflector.

329. A method for generating a laser beam with  
20 high power density and high energy for processing  
material, comprising the steps of:

providing a laser radiation source formed of a  
plurality of modulatable, diode-pumped fiber lasers;  
25 arranging outputs of the fiber lasers in a first  
ordering pattern;

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providing an optical unit connected to the outputs of the fiber lasers; and

5 using the optical unit for shaping and aligning laser beams emerging from the outputs of the individual fiber lasers such that they impinge onto a processing surface in a second ordering pattern.

10 330. The method of claim 329 including the step of arranging the outputs of the fiber lasers in at least one of at least one track next to one another and in at least one plane above one another for forming the first ordering pattern.

331. The method of claim 329 including the step of arranging the outputs of the fiber lasers in a bundle for forming the first ordering pattern.

15 332. The method according to claim 329 including the further steps of combining and bundling the laser beams in the optical unit for forming the second ordering pattern such that the laser beams generate processing points on the processing surface lying next to one another at at least one of in at least one track and lying above one another in at least one plane.

25 333. The method according to claim 329 including the step of combining and bundling the laser beams in the optical unit for forming the second ordering pattern such that the laser beams generate a single processing point on the processing surface.

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334. The method according to claim 329 including the step of directly modulating the laser beams generated in the fiber lasers with at least one of an electro-optical modulator, an electro-optical deflector, an acousto-optical modulator, and an acousto-optical deflector.

335. The method according to claim 329 including the step of coupling the outputs of the fiber lasers to the optical unit with adjustable terminators, and providing the terminators with lenses and using the lenses to shape the laser beams.

336. A laser radiation source for generating a laser beam with high power density and high energy for processing material, comprising:

a plurality of modulatable, diode-pumped fiber lasers having outputs arranged in a first ordering pattern; and

an optical unit coupled to the outputs of the fiber lasers wherein laser beams emerging from the outputs of the individual fiber lasers are shaped and aligned such that they impinge onto a processing surface in a second ordering pattern.

#### REMARKS

The specification, abstract, and drawings have been amended in accordance with U. S. format.

New claims are presented drawn in accordance with U. S. practice. These claims are not narrower than the

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original claims and were not submitted for patentability reasons. Rather, they consolidate the PCT prosecuted patent claims and they are presented in a format based on U. S. practice. Method claims have also been added somewhat similar to the apparatus claims.

An Information Disclosure Statement is enclosed.

Respectfully submitted,

  
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